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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/798,482

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EXAMINER

KRAIG, WILLIAM F

ART UNIT

PAPER NUMBER

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/798,482	Applicant(s) TAKAHASHI, AKIRA	
	Examiner William F. Kraig	Art Unit 2892	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 April 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3,5,11 and 14-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3,5,11 and 14-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The Examiner's previous objection to the drawings is withdrawn in light of the Decision on Petition dated 3/23/2010.

Specification

2. The amendment filed 3/24/2008 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

The amendment to Fig. 3(c) and the addition of Fig. 4 (both showing an element (labeled "9")) in combination with the modification of the specification to read "the doped polysilicon regions 4 and 5 and the dummy gate electrode region 6 form gate electrodes 7 and 8 and a dummy gate arrangement 9" and "the etched non-doped polysilicon dummy gate pattern" are not supported by the original disclosure. Specifically, there is nothing in the original disclosure which supports there being a structure remaining in the non-doped polysilicon region after the described etching process.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 103

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 3, 5, 11, 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liao et al. (U.S. Patent # 5783850) in view of Gabriel et al. (U.S. Patent # 6541359) further in view of Lee et al. (U.S. Patent # 5665203) with evidence provided by Lu (U.S. Patent # 4989057).

Regarding claims 3, 5, 15, 18 and 19, Liao et al. discloses a dry etching method for a semiconductor device, comprising the following steps of:

providing a polysilicon layer 26 (Col. 4, Lines 15-20) formed on a silicon substrate 20 (Col. 3, Lines 60-65);

implanting a first region of the polysilicon layer 26 with N type ions (Col. 4, Lines 25-40) and a second region of the polysilicon layer 26 with P type ions (right-most region of Fig. 7), a further region of the polysilicon layer (leftmost region of Figure 7) being left as a non-doped region (Col. 4, Lines 65-67);

forming an N type polysilicon gate electrode 41 from the first region (see middle region of Fig. 7), a P type polysilicon gate electrode 41 from the second region (right-most region of Fig. 7), and a non-doped polysilicon dummy gate arrangement 40 from the non-doped region of the polysilicon layer (left-most region of Fig. 7),

the N type polysilicon gate electrode occupying an area that is smaller than the first area (see Fig. 7), the P type polysilicon gate electrode occupying an area that is smaller than the second area (see Fig. 7).

Liau et al., however, fails to disclose the gate electrodes and the undoped polysilicon body being simultaneously etched during an etching process wherein the etching process includes at least one etching stage in which end point detection is based on the etching of the non-doped polysilicon body or wherein the non-doped polysilicon body occupies an area that is smaller than a total area occupied by the N type polysilicon gate electrode and the P type polysilicon gate electrode.

Gabriel et al. teaches simultaneously gate-etching (Gabriel et al., Col. 7, Lines 6-9) an N type polysilicon gate electrode (Gabriel et al., Fig. 5A (540, 550)), a P type polysilicon gate electrode (Gabriel et al., Fig. 5A (540, 550)) (Gabriel et al., Col. 6, Line 62 – Col. 7, Line 9), and a non-doped polysilicon body (Col. 7, Lines 1-9) during an etching process wherein an end point detection of one of the stages of the etching process is based on the etching of the non-doped polysilicon body (Col. 7, Lines 6-9).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the simultaneous gate etching process of Gabriel et al. into the device of Liau et al. The ordinary artisan would have been motivated to modify Liau et al. in the above manner for the purpose of avoiding microtrenching (Gabriel et al., Col. 2, Lines 35-45) while providing a strong detectable endpoint signal (Gabriel et al., Col. 7, Lines 1-10).

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Liau et al. and Gabriel et al., however, fail to disclose wherein the non-doped polysilicon body occupies an area that is larger than a total area occupied by the N type polysilicon gate electrode and the P type polysilicon gate electrode.

It would have been obvious to one of ordinary skill in the art to modify the size of the undoped polysilicon portion of Liau et al. and Gabriel et al. As is taught by Lu, the gate length/channel length of the transistor formed using the undoped portion of polysilicon in the gate is proportional to the breakdown voltage and holding voltage parameters of the device and the gate width/channel width of the transistor formed using the undoped portion of polysilicon in the gate is proportional to the current carrying capability of the device (Lu, Col. 7, Lines 40-55). Therefore, said gate length/channel length and gate width/channel width are considered to be result effective variables where the result is the modification of the breakdown and holding voltage levels of the semiconductor device. The claim to a change in the size of the undoped portion of the polysilicon layer therefore constitutes an optimization of ranges. *In re Huang*, 100 F.3d 135, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996).

Liau et al. and Gabriel et al. (with evidence provided by Lu) disclose the dry etching method (Gabriel et al., Col. 1, Lines 34-38) of claim 15, wherein the etching process includes a stage using a mixed gas of HBr and O₂ (Gabriel et al., Col. 1, Lines 63-65), but fail to disclose the etching process being a two step etching process wherein a second stage of the etch uses a mixed gas of HBr, O₂, and He.

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Lee et al. teaches a similar method wherein the gate etching process is a two-step process which uses a first stage atmosphere of HBr, Cl₂ and He and a second stage atmosphere of HBr, O₂ and He (Lee et al., Col. 2, lines 39-41).

It would have been obvious to one of ordinary skill in the art to incorporate the method of Lee et al. into the method of Liao et al. and Gabriel et al. The ordinary artisan would have been motivated to modify Liao et al. and Gabriel et al. in the above manner for the purpose of forming perfectly vertical gate sidewalls (Lee et al. Col. 2, Lines 23-28).

Regarding claim 11, Liao et al., Gabriel et al. and Lee et al. (with evidence provided by Lu) disclose the dry etching method according to claim 3, wherein the P type polysilicon gate electrode is disposed adjacent the N type polysilicon gate electrode (see Fig. 7 of Liao et al.).

Regarding claim 14, Liao et al., Gabriel et al. and Lee et al. (with evidence provided by Lu) disclose the dry etching method according to claim 3, wherein the nondoped polysilicon dummy gate arrangement is disposed adjacent the N type polysilicon gate electrode (see Fig. 7 of Liao et al.).

Regarding claim 16, Liao et al., Gabriel et al. and Lee et al. (with evidence provided by Lu) disclose the dry etching method according to claim 15, wherein the

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nondoped polysilicon dummy gate arrangement is disposed adjacent the N type polysilicon gate electrode (see Fig. 7 of Liao et al.).

Regarding claim 17, Liao et al., Gabriel et al. and Lee et al. (with evidence provided by Lu) disclose the dry etching method according to claim 15, wherein the P type polysilicon gate electrode is disposed adjacent the N type polysilicon gate electrode (see Fig. 7 of Liao et al.).

Response to Arguments

4. Applicant's arguments have been considered but are not found to be persuasive.

Applicant argues that the applied references do not disclose the claimed subject matter. The Examiner argues, as is outlined in the rejection above, that the references do disclose the claimed subject matter.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William F. Kraig whose telephone number is (571)272-8660. The examiner can normally be reached on Mon-Fri 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao X. Le can be reached on 571-272-1708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/W. F. K./
04/16/2010
Examiner, Art Unit 2892

/Thao X Le/
Supervisory Patent Examiner, Art
Unit 2892